

CLAIMS

1. A component installation apparatus adapted to assemble a plurality of components onto a plurality of fiber optic cables being processed within a multi-stage integrated optical component processing system, comprising:

at least one component dispensing tool; and

a component transfer tool rotatably coupled to at least one robot, wherein the component transfer tool and at least one robot are configured to cooperatively receive at least one of the plurality of components from the at least one component dispensing tool, rotate the at least one of the plurality of components to a transfer position, and transfer the at least one of the plurality of components onto at least one of the plurality of fiber optic cables.

2. The apparatus of claim 1, wherein the at least one component dispensing tool further comprises at least one elongated component dispensing tube configured to longitudinally store the plurality of components and sequentially dispense individual ones of the plurality of components therefrom.

3. The apparatus of claim 2, wherein the at least one component dispensing tool further comprises a component feeder assembly adapted to support the at least one elongated component dispensing tube.

4. The apparatus of claim 1, wherein the at least one component dispensing tool further comprises a nest plate moveable between a component loading position and a component transfer position and being adapted to receive the at least one of the plurality of components from the at least one elongated component dispensing tube.

5. The apparatus of claim 4, wherein the at least one component dispensing tool further comprises a separator air actuator adapted to move the nest plate in a horizontal plane and a pneumatic thruster adapted to raise and lower the nest plate to facilitate component dispensing.

6. The apparatus of claim 1, wherein the component transfer tool further comprises a component holding shaft adapted to receive the at least one of the plurality of components from the at least one component dispensing tool.

7. The apparatus of claim 6, wherein the component holding shaft is configured to move between a component loading position and a component transfer position.

8. An optical component installation system adapted to assemble an optical component on a fiber optic cable, comprising:

a robot adapted to retrieve an optical component from a component dispensing tube; and

a component transfer tool rotatably mounted to the robot, the component transfer tool being configured to transport the optical component from the component dispensing tube to an optical component carrier, and then install the optical component the fiber optic cable.

9. The optical component installation system of claim 8, wherein the component transfer tool further comprises a component holding shaft adapted to rotate between a component loading position and a component transfer position.

10. The optical component installation system of claim 8, further comprising an optical component dispensing tool adapted to regulate dispensing of the optical components from the component dispensing tube.

11. The optical component installation system of claim 10, wherein the dispensing tube further comprises a feeder assembly having a nest plate adapted to support the component dispensing tube.

12. The optical component installation system of claim 11, wherein the feeder assembly includes a separator air actuator adapted to move the nest plate in a horizontal plane and a pneumatic thruster adapted to raise and lower the nest plate between a component holding position and a component dispensing position.

13. The optical component installation system of claim 8, wherein the component dispensing tube is configured to hold a plurality of optical components therein, the plurality of optical components being stored longitudinally and in a manner that facilitates sequential distribution from the component dispensing tube.

14. The optical component installation system of claim 13, wherein the at least one component dispensing tube is about vertically aligned to facilitate the dispensing of the components through a dispensing orifice.

15. A method of transferring at least one optical component from a component dispensing tube onto at least one fiber optic cable, comprising;

dispensing an optical component from a component dispensing tube onto a component transfer tool positioned in a component loading position;
rotating the component transfer tool to a component transfer position; and
transferring the optical component onto the fiber optic cable.

16. The method of claim 15, wherein dispensing the optical component comprises positioning a component feeder in a component loading position and receiving the optical component thereon.

17. The method of claim 16, wherein positioning the component feeder comprises positioning a nest plate in a component loading position.

18. The method of claim 17, wherein positioning the component feeder comprises positioning the nest plate in a lowered position and then transferring the optical component to the component transfer tool.

19. The method of claim 18, wherein transferring the optical component to the component transfer tool comprises inserting a component holding shaft through an axial opening of the optical component and rotating the shaft to align the axial opening of the optical component with the longitudinal axis of the fiber optic cable.

20. A component installation apparatus adapted to transfer a plurality of components from a plurality of component storage locations to a plurality of fiber optic cables, comprising:

a plurality of component dispensing tube assemblies spaced adjacent a robot;

a component transfer tool rotatably coupled to the robot, wherein the component transfer tool includes a component holding shaft adapted to transfer one or more of the plurality of components from the component dispensing assemblies to at least one of the plurality of fiber optic cables; and

a component feeder assembly coupled to the component dispensing assemblies, wherein the component feeder assembly is adapted to facilitate the dispensing of at least some of the plurality of components from a plurality of component tubes mounted to and about vertically oriented to the component dispensing tube assemblies,

wherein the robot is adapted to position the component transfer tool between a component loading position adjacent the component tubes and a component dispensing position adjacent at least one of the plurality of fiber optic cables, and wherein the component transfer tool is adapted to position the component holding shaft to transfer the plurality of components thereon.

21. The apparatus of claim 20, wherein the component tubes are spring biased to provide a dispensing force to facilitate the dispensing of the plurality of components therefrom.

22. The apparatus of claim 20, wherein the robot comprises a first arm rotatably coupled by a joint to a rotatable second arm.

23. The apparatus of claim 22, wherein the component transfer tool is rotatably mounted to a distal end of the rotatable second arm to facilitate the transfer tool movement from the component loading to the component transfer position.

24. The apparatus of claim 20, wherein the component feeder assembly includes a nest plate adapted to support the dispensing tube assemblies and the component tubes.

25. The apparatus of claim 24, wherein the component feeder assembly comprises a separator air actuator adapted to move the nest plate in a horizontal plane, and a pneumatic thruster adapted to raise and lower the nest plate to facilitate dispensing of at least one of the plurality of components.

26. The apparatus of claim 20, wherein the component feeder assembly comprises a dispensing tool disposed adjacent and in sliding engagement with the component feeder assembly and adapted to facilitate the dispensing of at least one of the plurality of components.

27. The apparatus of claim 26, wherein the component tubes have a dispensing orifice therein, and wherein the dispensing tool is actuated by a dispensing actuator to dispense at least some of the plurality of components through the orifice.

28. The apparatus of claim 26, wherein the dispensing tool is adapted to move between a component loading position adjacent the orifice and a component transfer position, wherein the component holding shaft cooperatively engages with the dispensing tool to receive at least one of the plurality of components thereon.